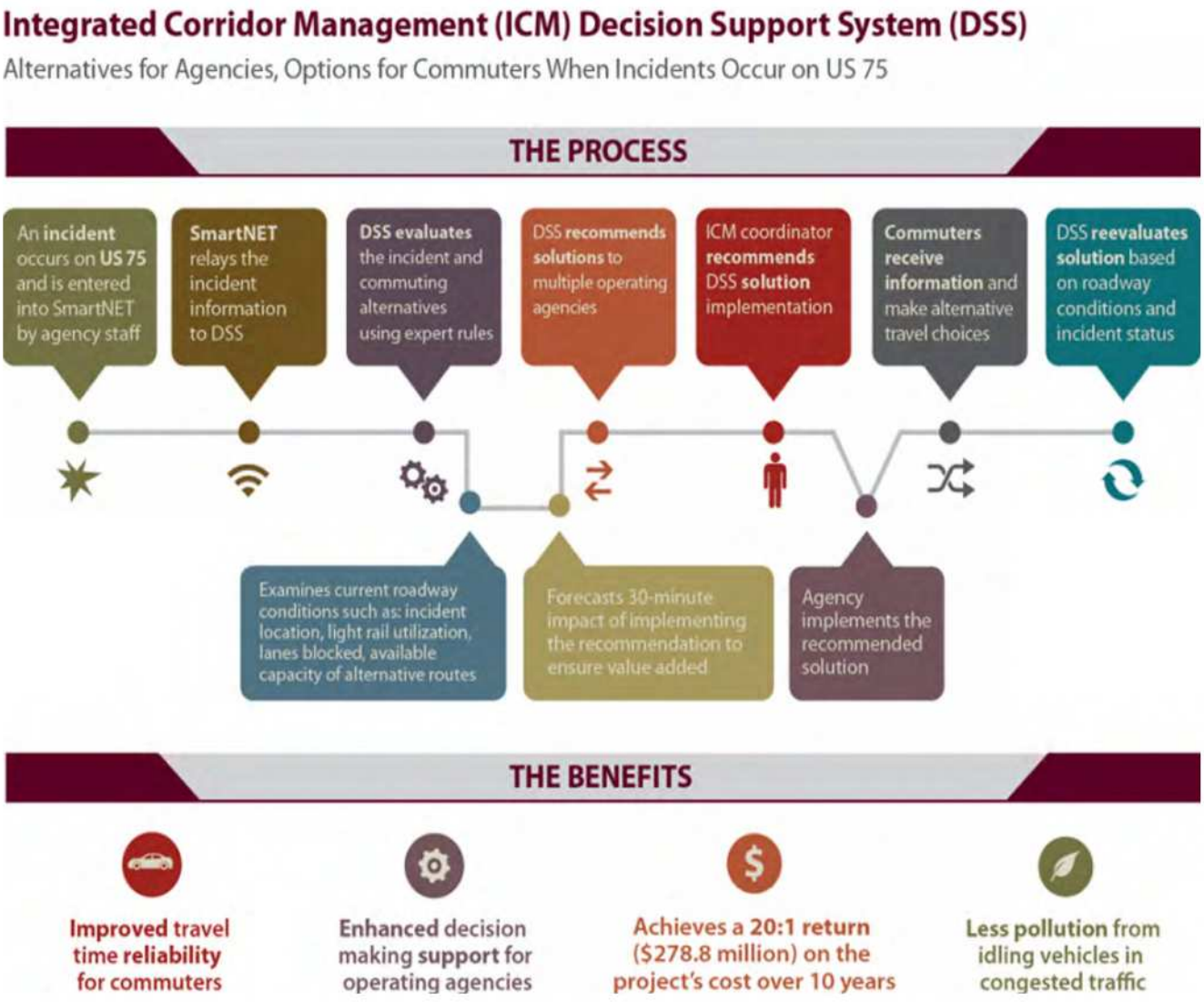

Source: DART; see *Section 24.6*

Figure 24.3-3 *Dallas ICM Decision Support System Process*

24.4 Managed Lanes

Managed lanes can consist of a lane, a set of lanes, or highway facility that functions independently from general-purpose lanes, under special operational strategies. These operational strategies include managing physical access, restricting vehicle eligibility, or employing variable pricing—often in real time in response to changing conditions.

Managed lanes provide flexibility to users by allowing them to choose the best method for taking a trip. This choice reduces congestion by taking advantage of existing roadway space more efficiently. If flow can be more efficiently maintained by pricing, eligibility, or access, more system users can get through the corridor.

The managed lanes term is generally used by transportation professionals to describe the broad category of special-use lanes. However, many agencies choose more generic marketing terms or brand names, such as express lanes.

Applications of managed lanes include the follow types:

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- *HOV (High-Occupancy Vehicle) Lanes*: Provide preferential access for carpools, transit vehicles, and select vehicle classes (depending on the facility). They typically provide travel time savings and trip reliability.
- *HOT (High-Occupancy Toll) Lanes*: Are similar to HOV lanes but allow lower-occupant vehicles (mostly single-occupant and sometimes two-person carpools) to use the lane by paying a toll. Carpools, transit vehicles, and select vehicle classes can use the lane without paying a toll.
- *Express Toll Lanes*: Primarily restrict access through the use of electronic tolling. Express toll lanes typically charge all or most travelers, including carpools. However, transit is normally excluded from paying tolls (*Figure 24.4-1*).
- *Bus-Only Lanes*: Restrict access to only approved transit vehicles. These lanes provide an added travel time benefit for people using transit. These lanes typically do not have tolling.
- *Truck-Only Lanes*: Restrict access to only trucks or other slow-moving vehicles. A truck-specific lane typically separates the slower, less-agile vehicles from the main lanes and allows higher speeds in the adjacent lanes for passenger cars. They can be temporary in the form of dynamic truck restrictions as discussed in *Chapter 23*. These lanes may or may not have tolling.
- *Non-Tolled Express Lane:* Restricts access to local interchanges on a freeway right-of-way and does not normally have tolling or physical separation. This type typically involves through lanes that are physically separated from local lanes.

24.4.1 Target Locations and Practices

- *Type of Location:* Areas with heavily congested corridors with few travel options, roads where specific vehicle types should be separated from other traffic, and areas where larger roadway improvements are not feasible.
- *Agency Practices*: Develop clear objectives that are consistent with the regional vision and corridor features. Encourage strong coordination between agencies, including transit and tolling functions.
- *Frequency of Reanalysis*: Continuous evaluation to ensure performance targets are met.
- *Supporting Policies or Actions Needed*: Tolling authority, extensive public outreach, diverse and equitable policies and practices, and strong project supporters.
- *Complementary Strategies:* Adding new toll infrastructure, bus rapid transit, active traffic management, and commercial vehicle accommodation.

24.4.2 Key Considerations

- The type of managed lane should support the regional long-range plan and the goals and objectives for the specific corridor. More and more, agencies are considering networks of managed lanes that connect different corridors to provide smooth service.
- Design and operational features can influence the development of managed lanes. The location and layout of access to the managed lanes are key factors. Priced managed lanes need to use electronic tolling systems that charge travelers at freeway speeds for use of the facility.
- Managed lanes can promote efficiency and/or reliability. Lane management strategies should be constantly monitored and evaluated so that operations can be adjusted as conditions change. A monitoring program can make sure the facility performs as expected.

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- Agencies may combine project objectives for managed lanes in a particular corridor. These objectives should be well presented in a concept of operations.
- Project objectives should address equitable access for the driving populations as well as the communities impacted by the facility, especially underserved diverse and low-income populations.

NCHRP Guidelines for Implementing Managed Lanes

NCHRP Research Report 835: Guidelines for Implementing Managed Lanes provides overall guidance for practitioners to develop and implement managed lanes. The guidebook offers support in the areas of planning, design, traffic control devices, implementation, and operations. See *Section 24.6*.

24.4.3 Implementation Examples

I-66 Inside the Beltway Express Lanes in Northern Virginia: The Virginia DOT opened the I-66 Inside the Beltway Express Lanes for operation in December 2017, running approximately 11 miles from I-495 west of Washington, DC, to Route 29 in Fairfax and Arlington Counties in Northern Virginia. The managed lanes on I-66 are unique because there are no adjacent general-purpose lanes. The lanes operate as a HOT facility with two-person carpools, transit vehicles, emergency vehicles, and motorcycles traveling toll-free. HOT rules apply during the peak periods in the peak direction of flow, and the lanes operate as general-purpose lanes during all other times.

After opening, the I-66 Express Lanes experienced an increase in use with 60 percent of total volume consisting of toll-exempt HOVs. For the remaining trips, the average tolled trip for single-occupancy vehicles (SOVs) in 2019 was $8.88 westbound and $4.60 eastbound. The Northern Virginia Transportation Commission (NVTC) established a Commuter Choice Program that selects projects to fund with excess toll revenue. Projects funded, to date, have included support for new commuter bus services.

I-15 Express Lanes in San Diego, California: The I-15 Express Lanes are operated by the San Diego Association of Governments. A 16-mile section consists of four managed lanes with a moveable median barrier that can change the number of lanes in each direction. The lanes are priced for SOVs, and occasional ramps exist along the corridor. Bus rapid transit (BRT) is a significant component of the project, with new BRT stations being built along the route.



Source: Noah Berger, 2019

Figure 24.4-1 I-680 Express Lane

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Performance Measures

Potential Benefits of Managed Lanes

- *Improves Travel Time Reliability*—By restricting access during peak times of travel demand.
- *Increases Speed and Efficiency*—For all lanes on the corridor.
- *Increases Safety*—By removing large trucks and transit vehicles from the main traffic flow.

The I-15 Express Lanes use dynamic pricing. Toll rates typically vary from $0.50 to $4.00 but can rise as high as $8.00 in severe congestion. The use of technology allows for measuring current traffic conditions. The toll rate is then adjusted to ensure free-flow conditions in the express lanes. DMSs are used to post the toll rate prior to the entrance of the facility to alert drivers to the current toll.

24.4.4 Implementation Issues

Public resistance to managed lanes is common. This is especially true when a facility increases an occupancy requirement or charges tolls for the first time. Surveys and usage statistics from Houston, Minneapolis, and San Diego show that drivers from all income levels use managed lanes.

To ensure success with managed lanes, broad communication involving planners, public officials, decision makers, and the public is vital. Special projects may require including certain groups and targeting specific audiences. Marketing and outreach efforts typically involve multiple strategies to reveal the impacts and benefits of managed lanes to the public. Identifying project supporters and promoting equitable access are also keys to success.

24.4.5 Project Timeframe

The length of time required to implement a managed lane depends on whether a new lane is needed or a current section can be used to create the managed lane. Building a new lane requires more time and expense than converting a shoulder or reconfiguring the lane width on all the lanes of a facility. Also, toll lanes may require new infrastructure. Tolling components include overhead signs, and tolling and monitoring systems.

24.4.6 Cost

The project cost depends on the type of facility being constructed or adapted. Costs can vary based on needs such as equipping an existing HOV lane with tolling technology or constructing additional lanes. Right-of-way requirements may greatly increase the cost. Additional maintenance and operational costs should also be expected. One example of an additional cost is the need to provide a traffic management center with the equipment and personnel necessary to monitor conditions. Finally, tolling can increase the cost of operations, but the cost may be less if tolling infrastructure is already present in the area.

24.4.7 Data Needs

Managed lanes are mainly evaluated using data on volume, speed, and road capacity. Priced managed lanes are evaluated using historical toll data, revenue generated, and statistics on how drivers respond to price changes. Performance objectives should focus on increasing person throughput on the managed lane facility in comparison to averages on the general-purpose lanes. Accurate vehicle occupancy data is critical.

Current traffic volumes, peak-hour volumes, and speed data help evaluate the level of congestion on the roadway. Truck volumes are needed to examine the use of truck-only lanes. Transit statistics are used to determine the average bus delay, ridership, and number of buses that travel on the managed lane.

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Other useful data may include:

- Lane widths.
- Shoulder widths and pavement condition.
- Segment lengths.
- Area speed.
- Estimated congestion caused by large vehicles.
- Volumes by time of day.
- Available right of way.

NCHRP Synthesis Report on Emerging Challenges to Priced Managed Lanes

NCHRP Synthesis Report 559 (see *Section 24.6*) provides an overview of how agencies addressed varying challenges to the implementation and operation of priced managed lanes. The challenges focused on the public acceptance of tolling, maximum toll caps, and carpool enforcement.

24.5 Summary

This chapter provides an overview of the advanced and integrated tactics agencies can implement to elevate TSMO for congested transportation networks. ATDM, managed motorways, ICM, and managed lanes are tactics that have the potential to leverage technology when integrated to address specific issues. Agencies can combine individual tactics based on specific congestion levels, bottlenecks, and existing tactics to work to achieve mobility objectives. As conditions evolve, agencies can adapt the tactics as needed to proactively address needs on the network. These tactics serve as a forward-looking approach to TSMO and work in tandem with other tactics to provide a holistic TSMO program that meets the needs of the entire community.

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